AMENDMENTS TO THE CLAIMS

Claims 1-5 (Canceled)

Please add the following new claims 6-10:

6. (New) A method of measuring a depth of a hole in a grounded composite-material workpiece being machined by an orbital cutting process, comprising said steps of:

applying a low-level electric potential to an electrically insulated cutting tool, said cutting tool having a longitudinal center axis and a cutting head with both a radial cutting edge and an axial cutting edge and with a predetermined axial length;

rotating said cutting tool about said longitudinal axis;

axially advancing said cutting tool towards the workpiece;

determining a first zero reference position of said cutting tool as said cutting tool initially makes contact with a first outer surface of the workpiece and thereby closing an electric circuit through the workpiece;

keeping a measuring element for measuring an axial movement of said cutting tool activated from said first zero reference position;

performing an orbital rotation of said cutting tool about a principal axis;

axially feeding said cutting tool into the workpiece;

monitoring a specific character of said electric potential during an advancement of said cutting tool through the workpiece;

detecting a point of breaking of said electric circuit when said cutting head of said cutting tool penetrates an opposite second surface of the workpiece; and

determining, by help of said measuring element, said depth of said hole by deducting said

predetermined axial length of said cutting head having penetrated the workpiece from a total length of axial advancement of said cutting tool from said first zero reference position to said point of breaking of said electric circuit through the workpiece.

7. (New) A method of measuring a depth of a hole in a grounded composite-material workpiece being machined by an orbital cutting process, comprising said steps of:

applying a low-level electric potential to an electrically insulated cutting tool, said cutting tool having a longitudinal center axis and a cutting head with both a radial cutting edge and an axial cutting edge and with a predetermined axial length;

rotating said cutting tool about said longitudinal axis;

axially advancing said cutting tool towards the workpiece;

determining a first zero reference position of said cutting tool as said cutting tool initially makes contact with a first outer surface of the workpiece and thereby closing an electric circuit through the workpiece;

keeping a measuring element for measuring an axial movement of said cutting tool activated from said first zero reference position;

performing an orbital rotation of said cutting tool about a principal axis;

axially feeding said cutting tool into the workpiece;

monitoring a specific character of said electric potential during an advancement of said cutting tool through the workpiece;

detecting a point of breaking of said electric circuit when said cutting head of said cutting tool penetrates an opposite second surface of the workpiece;

performing a small incremental increase of said radial offset of said cutting tool;

axially backing said cutting tool to make contact with said second surface of the workpiece for determining a second reference position of said cutting tool as it recloses said electric circuit; and

calculating the depth of the hole produced by said cutting tool by a help of said first zero reference position and said second reference position.

8. (New) The method of claim 6, wherein the composite-material workpiece includes at least two layers of material.

9. (New) The method of claim 8, wherein at least one of said layers includes a fiber-reinforced composite material.

10. (New) An orbital machining apparatus for producing a hole in a composite-material workpiece and measuring a depth of the hole, said apparatus comprising:

a rotatable spindle including ceramic bearings electrically insulating said rotatable spindle from surrounding components of said orbital machining apparatus;

a cutting tool being carried by said rotatable spindle, said cutting tool having a longitudinal center axis and a cutting head with both a radial cutting edge and an axial cutting edge and with a predetermined axial length;

a first actuator configured for rotating said cutting tool about said longitudinal center axis during a machining of the hole;

a second actuator configured for moving said cutting tool in an axial feed direction towards and into the workpiece substantially parallel to said tool axis, said second actuator being

simultaneously operable with said first actuator;

a third actuator configured for rotating said cutting tool about a principal axis, said principal axis being substantially parallel to said longitudinal center axis of said cutting tool and coaxial with a longitudinal center axis of the hole to be machined, said third actuator being simultaneously operable with said first actuator and second actuator;

a radial offset mechanism configured for controlling a radial distance of said longitudinal center axis cutting tool from said principal axis;

a low voltage source connected to said rotatable spindle; and

a measuring element connected to said rotatable spindle, said measuring element for measuring an axial movement of said rotatable spindle, said measuring element being configured to register a first zero reference position of said cutting tool when said cutting tool initially makes contact with a first surface of the workpiece and closes an electric circuit with a ground through the workpiece, and to register a second reference position, when one of said electric circuit is broken as said cutting head has penetrated an opposite second surface of the workpiece and when said cutting head, after penetrating the second surface, is backed to make contact with the second surface of the workpiece for determining said second reference position of said cutting tool as it recloses said electric circuit with said ground.